

Weaker dilution effect of sea ice melting accounted for the rebound in calcium carbonate saturation in the Canada Basin, Arctic Ocean, after 2007

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Calcium carbonate undersaturation of seawater is one of the most serious threats of ocean acidification and has been observed for the first time in the Canada Basin in 2008^[1]. It was associated with increased anthropogenic CO₂ and extensive melting of sea ice. Here, by analyzing observations between 1997 and 2016 obtained in the Canada Basin, we found that calcium carbonate saturation state (Ω) decreased rapidly from 1997 to 2007 and increased slightly from 2007 to 2016 in spite of the continuing increase of atmospheric CO₂. The sharp drop in sea ice coverage in 2007 induced a great amount of fresh water discharge into the surface layer of Canada basin, which accounted for the decrease of calcium carbonate undersaturation to $\Omega < 1$. After 2007, sea ice coverage decline showed an obvious slacken and the amount of fresh water discharge decreased so that the aggravating effect on ocean acidification got weaker. On the contrary, the outflow of fresh water from the Canada Basin had a relieving influence on ocean acidification, which offset the aggravating influence caused by sea ice melting partly. It was the main reason why the calcium carbonate saturation state rebounded after 2007, which looks like transient good news for the marine ecosystem in the arctic.

References

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